NiSource
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July 8, 2005

BY OVERNIGHT DELIVERY AND E-FILE

Mary L. Cottrell, Secretary
Department of Telecommunications and Energy
One South Station
Boston, MA 02110

Re: Bay State Gas Company, D.T.E. 05-27

Dear Ms. Cottrell:

Enclosed for filing, on behalf of Bay State Gas Company ("Bay State"), please find Bay State's responses to the following information requests:

From the Attorney General:

AG-14-15 AG-14-16 AG-14-17 AG-14-18 AG-14-20

AG-14-26

Please do not hesitate to telephone me with any questions whatsoever.

Very truly yours,

Patricia M. French

cc: Per Ground Rules Memorandum issued June 13, 2005:

Paul E. Osborne, Assistant Director – Rates and Rev. Requirements Div. (1 copy)
A. John Sullivan, Rates and Rev. Requirements Div. (4 copies)
Andreas Thanos, Assistant Director, Gas Division (1 copy)
Alexander Cochis, Assistant Attorney General (4 copies)
Service List (1 electronic copy)

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

RESPONSE OF BAY STATE GAS COMPANY TO THE
FOURTEENTH SET OF INFORMATION REQUESTS FROM ATTORNEY GENERAL
D. T. E. 05-27

Date: July 7, 2005

Responsible: Danny G. Cote, General Manager

AG-14-15 Refer to the Company's response to AG-2-16(a), p. 9 of 23 and AG-2-16(b), p. 4 of 34. In order to reduce the number of leaks on bare steel mains, should the Company have increased its rate of replacement of bare steel mains from 1993 to 2003 in the Brockton Service area? Does Ed Anderson of R.J. Rudden Associates agree with the Company's response?

Response: During the period 1993-2003, the Company was replacing significant amounts of its bare steel mains. The Company monitored the number of leaks remaining in backlog at the end of each year. Table AG-14-16 illustrates BSG's DOT data for leaks in backlog at year end.

TABLE AG-14-16

Year	BSG DOT Data YE Leak Backlog
1993	36
1994	8
1995	10
1996	23
1997	27
1998	21
1999	36
2000	16
2001	12
2002	20
2003	101

This measure is a direct indicator of BSG's management of its leaks. This measure, as viewed each year by the Company, indicated the Company was replacing sufficient quantities of its bare steel mains to control its leaks.

Also during the period 1993-2003, the Company observed that the total number of leaks continued to vary year to year. As illustrated in AG-2-16(a), p. 14 of 23, during the period 1993 through 1999, Brockton's corrosion leaks were only modestly increasing. The spike in the leaks observed in 1994 did not ultimately signal that the Company was replacing insufficient quantities of bare steel mains since the following three years showed lower leak rates (1995-1999 averaged only slightly higher than 1993). During the period 2000 through 2003, again, the leaks varied but the leak rate trend continued to increase.

As illustrated in AG-2-35c, the Company responded to the recognition of the trend of increasing corrosion leaks in Brockton by replacing more bare steel in 2003 over 2002 and again more in 2004 over 2003 as well as planning for a significant increase in replacements in 2005 over 2004.

Ed Anderson of R.J. Rudden Associates has reviewed this response and believes the approach of the Company was reasonable and appropriate given the known facts.

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_AG-14-16 Refer to the Company's response to AG-2-16(a), p. 9 of 23 and make the following two alterations and then re-plot the graph:

A) Disaggregate the "miles of mains" data to show miles of bare steel and miles of coated steel without cathodic protection as separate figures.

B) Disaggregate the "corrosion leaks per mile" data to show corrosion leaks per mile for bare steel and corrosion leaks per mile for coated steel without cathodic protection as separate figures.

Did Ed Anderson of R.J. Rudden Associates examine the data as presented in the redrawn graph?

Response:

The graph referred to (AG-2-16(a), p. 9 of 23) plots bare steel and unprotected coated steel leaks. However, the request appears instead to be directed to Chart #9 on AG-2-16(a), p. 16 of 23, which plots corrosion leaks per mile of bare steel and unprotected coated steel main.

Bay State does maintain the data differentiated sufficiently to plot the requested graphs.

Ed Anderson of R.J. Rudden Associates has reviewed this response and agrees with its conclusion.

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AG-14-17 Refer to the Company's response to AG-2-16(a), p. 22 of 23. Produce a copy of the referenced text, Peabody's "Control of Pipeline Corrosion" relied upon for the reference in footnote 9.

Response: Refer to Attachment AG-14-17.

PEABODY'S
CONTROL OF PIPELINE CORROSION

SECOND EDITION

A.W. PEABODY

Edited by
RONALD L. BIANCHETTI

NACE International
The Corrosion Society
1440 South Creek Drive
Houston, Texas 77084

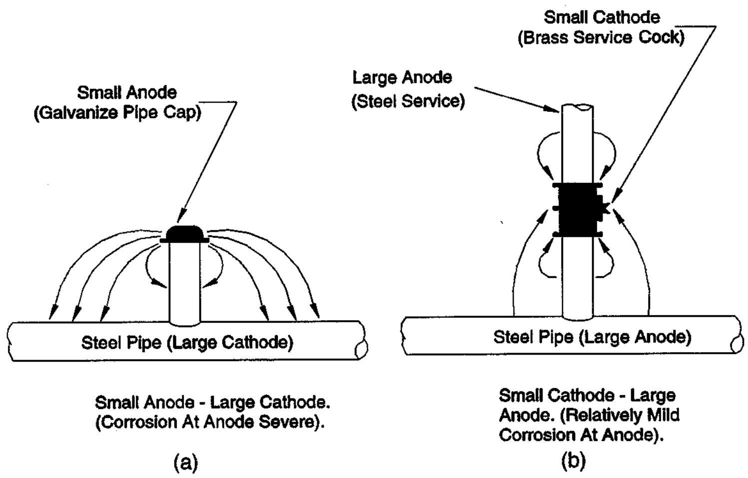

Figure 16.12 Schematic showing the effect of anode to cathode area ratio on galvanic corrosion.

initiated the differential corrosion cell, if the anodic area is relatively small in relation to the cathodic area, corrosion will be severe. If, on the other hand, the anodic area is large as compared to the cathodic area, corrosion will be relatively mild.

CATHODIC PROTECTION

The principal methods for mitigating corrosion on underground pipelines are coatings and CP. A primary function of a coating on a cathodically protected structure is to reduce the surface area of exposed metal on the pipeline, thereby reducing the current necessary to cathodically protect the metal. CP is defined as "a reduction of the corrosion rate by shifting the potential of the structure toward a less oxidizing potential by applying an external current." This can be shown graphically on an Evans diagram as indicated in Figure 16.13. In the illustration, the potential of the metal is shifted from the free corrosion potential, E_{corr} to the value E_{CP} by the application of the CP current, $i_{applied}$. As the potential becomes more negative, the corrosion rate decreases, as defined by the anodic kinetics, while the rate of the cathodic current increases. This difference between the anodic and cathodic kinetics is the amount of current required to maintain the indicated potential and is equivalent to the CP current applied to a structure.

It is important to note that complete protection is not achieved until the potential of the metal is shifted to the equilibrium potential, E_{equil}. At this potential, the net corrosion rate is zero. Usually, it is not practicable to achieve complete protection because of the high current required; the applied current increases exponentially with decreasing potential. Since anodic Tafel slopes are typically around 100 mV, a 100 mV negative shift in the

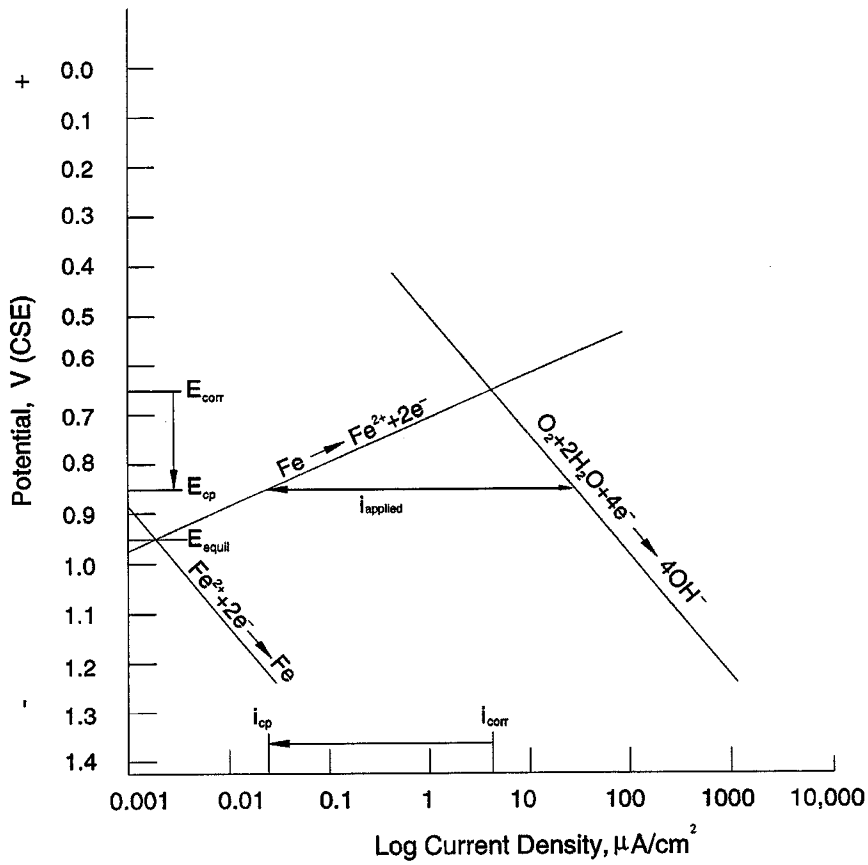

Figure 16.13 Evans diagram demonstrating mechanism of CP.

potential will decrease the corrosion rate by a factor of 10. This magnitude of decrease is typically considered to be adequate to protect most structures.

The required shift in potential can be achieved by means of an external power source (referred to as impressed current CP) or by utilizing a sacrificial anode. The impressed current system uses a power supply, referred to as a rectifier, and an anode buried in the ground to impress a current on the structure. The sacrificial anode system uses the galvanic relationship between a sacrificial anode material, such as zinc or magnesium, and the pipe steel to supply the required CP current.

ENVIRONMENTAL POLARIZATION

The concepts presented for CP are fundamentally correct at the instant that CP is applied but are too simplistic to consider the time-dependant behavior of a cathodically protected

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Responsible: Danny G. Cote, General Manager

AG-14-18 Refer to the Company's response to AG-2-16(a), p. 3 of 23. Did Ed Anderson of R.J. Rudden Associates consider any other measure of utility performance besides the "Leak Backlog / Repair Ratio" in drawing the conclusion that the Company has demonstrated excellent leak management? If "yes", explain what other information was considered and the conclusions reached. Include in this answer all other generally accepted methods of corrosion control in the gas distribution industry.

Response: Ed Anderson of R.J. Rudden Associates considers a key measure of utility leak management performance to be the "Leak Backlog / Repair Ratio". He also believes that the trend of year end leaks in back log is an important indicator of a company's ability to manage its leaks. Maintaining a low level of leaks in backlog at year end is particularly important in colder regions, such as Bay State's service areas where the development of wintertime underground frost creates additional risks for a gas operator. Therefore, according to Mr. Anderson (as requested), a trend of lower level year end leaks is a good indicator that the Company is managing its leaks well. (Illustrated in AG-2-16(a), p. 10-13 of 23). These two measures are industry indicators that can be used to compare leak management performance among different companies. These two measures are directly impacted by a company's performance of leak and corrosion management activities.

In addition, Ed Anderson believes that Bay State's leak surveillance Operating & Maintenance Procedures 14.06, which requires the complete distribution system be surveyed at least once annually, is two times the survey requirement of the Massachusetts code, (for areas outside of business districts), which only requires the system be surveyed at least once in every consecutive twenty-four month period. Furthermore, it is Mr. Anderson's understanding that Bay State performs additional leak detection surveys, not required by the Massachusetts code or Bay State's Operating & Maintenance Procedures to help ensure the safe operation of the Bay State system. For example, while there is frost in the ground, Bay State performs special frost leak detection surveys. In addition during the winter, Bay State performs a winter survey of bare steel mains.

Mr. Anderson believes that the additional coordination, staffing and expense required by the Company to perform these important additional surveys are solid indicators that these practices are examples of Bay State's dedication to excellent leak management.

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Responsible: Danny G. Cote, General Manager

AG-14-20 Refer to the Company's response to AG-2-16(a), p. 3 of 34, and the responses to AG-2-35(c) and AG-2-39. After reviewing this material does R.J. Rudden Associates change any of its conclusions and opinions? If "yes", explain those changes.

Response: Rudden has reviewed the responses AG-2-16(a), p. 3 of 34, and the responses to AG-2-35(c) and AG-2-39 and does not change its conclusion and opinions. The data Rudden utilized in its analysis was Bay State DOT data. DOT data is consistently reported among utilities and therefore was data that could be used to compare Bay State to other companies.

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Responsible: Danny G. Cote, General Manager

AG-14-26 Refer to the Company's response to AG-2-16(a), p. 12 of 34. If "BSG's maintenance and replacement of older piping has been consistent with these general industry practices," how does R.J. Rudden Associates explain the accelerating leak rate in the Brockton Service area?

Response: RJ Rudden Associates indicates that the data reviewed did not provide a clear reason why the leak rate is increasing. However, based on Rudden's experience, it is its opinion that the accelerating leak rate in the Brockton Service area is the result of two key elements.

First, the segments of bare and unprotected coated steel pipeline are beginning to show signs that they are approaching the end of their useful life due to the effects of corrosion. According to Rudden, these pipes have been buried and unprotected from the effects of corrosion for at least 35 years. Rudden also notes that it is its understanding that there are unprotected coated steel mains in the ground since the 1940's and that there is bare steel that is even older.

Rudden notes that second, it is its opinion that as customer gas requirements have grown on the Bay State distribution system, the Company has had to operate its 100 psi system closer to its limit than in earlier years, in order to maintain adequate supply pressures at the low points on the system. For example, during milder weather, the 100 psi system may operate at lower pressures (ex. 55 psi) and when colder, increased customer demand on the system results in Bay State increasing the pressures up to the maximum level of 100 psi.

Rudden indicates that as segments of the pipe develop pinhole corrosion leaks, such leaks on Brockton's 100 psi system will be more evident, because the higher pipeline operating pressure will cause more gas to escape. Therefore, the leak will be detected earlier by Bay State's wintertime leak detection surveys, routine leak detection surveys or customers, as compared to if the same leak occurred on a lower pressure main.

Rudden describes that the relationship of higher leaks to cold weather may be reasonably illustrated by recognizing that the winter of 2001-2002 was the warmest in over 100 years for the Northeast region and as illustrated in AG-2-16(a), p. 9 of 23, Bay State's leaks in 2002 were the lowest since 1997- 1998 winter. The 1997-1998 winter which was the next warmest winter for Worchester was also a low leak rate year.

Rudden indicates, in response to this question, that it understands that Bay State is aware of this relationship and operates the system only as high as it needs to, for the shortest duration, in order to minimize the impact on leak rates. Further, the management of the distribution system operating pressures by Bay State to meet its system load requirements is, in Rudden's opinion, a reasonable way to manage load.